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Date: MARCH 29, 2005

To: EXAMINER GUTMAN, H.
U.S. PATENT AND TRADEMARK OFFICE

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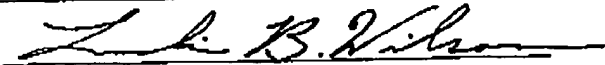
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	Application Number	10/664,806
	Filing Date	SEPTEMBER 17, 2003
	First Named Inventor	TIMOTHY K. SEARFOSS
	Group Art Unit	3612
	Examiner	GUTMAN, H.

ENCLOSURES (check all that apply)		
<input type="checkbox"/> Amendment <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Status Letter <input type="checkbox"/> Extension of Time Request (dupli)	<input type="checkbox"/> Assignment Papers (for an Application) <input type="checkbox"/> Drawings <input type="checkbox"/> After Allowance Communication to Group <input type="checkbox"/> Petition Raising Slip (PTO/SB/69) and Accompanying Petition <input type="checkbox"/> Change of Correspondence <input type="checkbox"/> Declaration <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Small Entity Statement <input type="checkbox"/> Request of Refund	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input checked="" type="checkbox"/> Appeal Brief in Response to Notice of Noncompliant Brief <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Post Card Receipt <input checked="" type="checkbox"/> Additional Enclosure(s) (please identify below): <input checked="" type="checkbox"/> Claims Appendix - Claims 1-33 <input checked="" type="checkbox"/> Appendix B - D <input type="checkbox"/>
<input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement, PTO-1449, art <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/ Incomplete Application	<input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account No. <u>50-1713</u> . A duplicate copy of this sheet is enclosed.	
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Indep.		Minus			x \$100=	0		x \$200=	
					+ \$180=	—		+ \$380=	
First Presentation of Multiple Dep. Claim					total add'l fee		\$ 0	total add'l fee	
							\$ 0		

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Attorney Docket No	3000/22
Application Number	10/664,806
Filing Date	SEPTEMBER 17, 2003
First Named Inventor	TIMOTHY K SEARFOSS
Group Art Unit	3612
Examiner	GLITMAN, H

ENCLOSURES (check all that apply)

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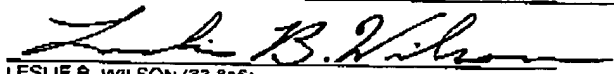
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First Presentation of Multiple Dep. Claim					x \$180=	—		x \$360=	
					total add'l fee	\$ 0		total add'l fee	\$ 0

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Signature

March 29, 2005

Date of Signature

PATENT-APPEAL
Attorney Docket No.: 3000/22IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re patent application of:

TIMOTHY K. SEARFOSS

Serial No.: 10/664,806

Filed: SEPTEMBER 17, 2003

Title: TRAILER COVER SYSTEM

Examiner: GUTMAN, H.

Group Art Unit: 3612

APPEAL BRIEF IN RESPONSE TO NOTICE OF NONCOMPLIANT BRIEF

Commissioner for Patents
P O. Box 1450
Alexandria, VA 22202-1450

Sir:

This is an appeal from the final rejection of claims 1-33 in the Office Action mailed
September 7, 2004.

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REAL PARTY IN INTEREST

The real party in interest is Roll Rate Corporation.

RELATED APPEALS AND INTERFERENCES

No other appeals or interferences are known which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

STATUS OF CLAIMS

This application was filed September 17, 2003 with claims 1-33 (reproduced in Claims Appendix). The claims were not amended, and are the subject of the present appeal.

STATUS OF AMENDMENTS

There are no unentered amendments.

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SUMMARY OF CLAIMED SUBJECT MATTER

The invention is a rail 38 for a top of a wall 34 of a trailer. The rail 38 comprises a body adapted to engage the top of the wall 34. The body has a concave surface 56 adapted to receive a cover reel 32:

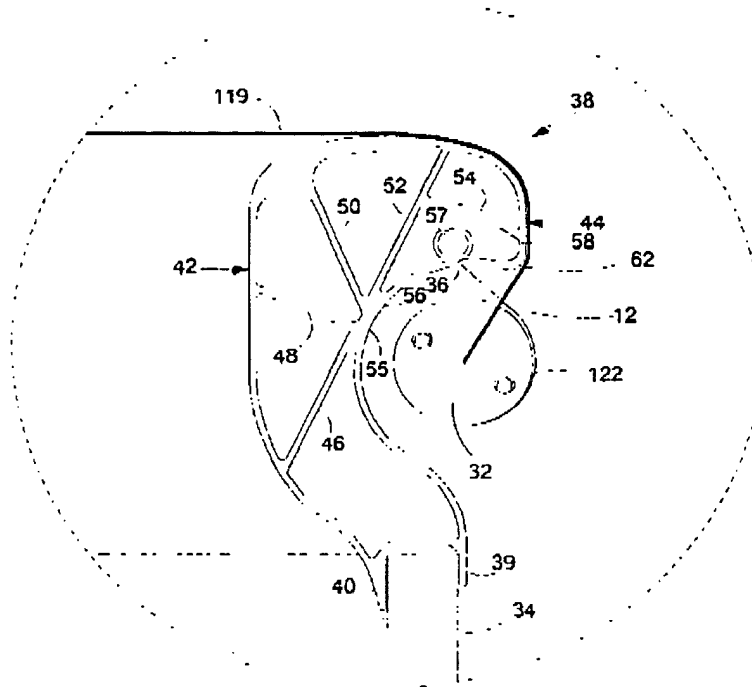


FIG. 3

All of the independent claims recite "a body adapted to engage the top of the wall" and/or the body "having a concave surface."

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GROUND OF REJECTION TO BE REVIEWED ON APPEAL

1. The Examiner maintains that the application improperly claims priority to itself.
2. Independent claim 1 was finally rejected under §102(e) over U.S. Patent No. 6,513,856 to Swanson et al. (Appendix B).
3. Independent claims 1, 12 and 23 were finally rejected over U.S. Patent No. 5,984,400 to Miller et al. (Appendix C) either alone (claim 1) or in combination with a secondary reference (claims 12 and 23).

GROUPING OF CLAIMS

Claims 1, 12 and 23 are the independent claims involved in the appeal. The dependent claims stand or fall with their respective independent claim.

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ARGUMENT

A. A corrected declaration has been filed, obviating the rejection

The Examiner maintains that the application improperly claims priority to itself. A supplemental declaration was filed on August 16, 2004, but the Examiner has not acknowledged receipt of that document. The Examiner also included a boilerplate reminder of the proper format for an abstract, but did not detail any deficiencies in the abstract as filed. Thus, neither of these matters is considered to be an issue that would preclude this application from issue.

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C. Miller's Channel Is Not Concave

The Examiner maintains that a channel 56 of Miller et al. '400 is "generally concave since it extends inwardly and is generally C-shaped." Office Action mailed September 7, 2004 at page 7

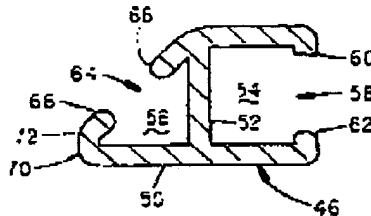


FIG. 3

The second issue in this appeal is whether the channel 56 of Miller '400 is concave.

"Concave" means "curved like a segment of the interior of a circle or hollow sphere, hollow and curved." Webster's Encyclopedic Unabridged Dictionary of the English Language (1989) (Appendix D).

Miller et al. '400 shows a channel 56 with two walls extending at 90 degree angles from each other. The Examiner's statement that she "believes" the channel 56 "to be generally concave since it extends inwardly and is generally C-shaped" does not change either the definition of "concave" or the disclosure of Miller et al. '400.

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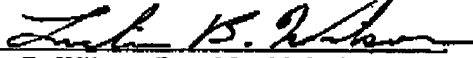
SUMMARY

The Examiner maintains that the references show something that they plainly do not.
The final rejection of claims 1-33 should be reversed.

Respectfully submitted,

TIMOTHY K. SEARFOSS

Date: March 29, 2005

By: 
Leslie B. Wilson (Reg. No. 33,816)
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Evanston, IL 60201

Enclosures: Claims Appendix - Claims 1-33
Appendix B - U.S. Patent No. 6,513,856 to Swanson et al.
Appendix C - U.S. Patent No. 5,984,400 to Miller et al.
Appendix D - entry from Webster's dictionary

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CLAIMS APPENDIX

- 1 A rail for a top of a wall of a trailer, the rail comprising:
a body adapted to engage the top of the wall, the body having a concave surface adapted to receive a cover reel.
- 2 The rail of claim 1 wherein the concave surface faces away from the trailer
- 3 The rail of claim 1 further comprising at least one leg connected to the body.
- 4 The rail of claim 3 wherein the at least one leg is adapted to engage the top of the wall.
- 5 The rail of claim 3 wherein the at least one leg is adapted to be welded to the top of the wall.
- 6 The rail of claim 1 wherein the body comprises a plurality of ribs.
- 7 The rail of claim 1 wherein the body includes an opening adapted to anchor a cover.
- 8 The rail of claim 1 wherein the body extends at least a majority of a length of the wall of the trailer.
- 9 The rail of claim 1 wherein the body comprises aluminum
- 10 The rail of claim 1 wherein the body comprises a polymer.
- 11 The rail of claim 1 wherein the body is extruded.
- 12 An apparatus for extending and retracting a cover over a trailer, the apparatus comprising:
a base pivotably connected to the trailer;
an extension connected to the cover and pivotably connected to the base; and
a rail for a top of a wall of the trailer, the rail including a body adapted to engage the top of the wall, the body having a concave surface adapted to receive a cover reel

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13. The apparatus of claim 12 wherein the concave surface faces away from the trailer.
14. The apparatus of claim 12 further comprising at least one leg connected to the body.
15. The apparatus of claim 14 wherein the at least one leg is adapted to engage the top of the wall
16. The apparatus of claim 14 wherein the at least one leg is adapted to be welded to the top of the wall.
17. The apparatus of claim 12 wherein the body comprises a plurality of ribs.
18. The apparatus of claim 12 wherein the body includes an opening adapted to anchor the cover.
19. The apparatus of claim 12 wherein the body extends at least a majority of a length of the wall of the trailer.
20. The apparatus of claim 12 wherein the body comprises aluminum.
21. The apparatus of claim 12 wherein the body comprises a polymer.
22. The apparatus of claim 12 wherein the body is extruded
23. An apparatus for extending and retracting a cover over a trailer, the apparatus comprising:
 - a base pivotably connected to the trailer;
 - an extension connected to the cover and pivotably connected to the base;
 - a reel connected to the extension;
 - a motor mounted on the extension and drivingly engaged with the reel to selectively extend and retract the cover over the trailer; and
 - a rail for a top of a wall of the trailer, the rail including a body adapted to engage the top of the wall, the body having a concave surface adapted to receive the reel.

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24. The apparatus of claim 23 wherein the concave surface faces away from the trailer.
25. The apparatus of claim 23 further comprising at least one leg connected to the body.
26. The apparatus of claim 25 wherein the at least one leg is adapted to engage the top of the wall.
27. The apparatus of claim 25 wherein the at least one leg is adapted to be welded to the top of the wall.
28. The apparatus of claim 23 wherein the body comprises a plurality of ribs.
29. The apparatus of claim 23 wherein the body includes an opening adapted to anchor the cover
30. The apparatus of claim 23 wherein the body extends at least a majority of a length of the wall of the trailer.
31. The apparatus of claim 23 wherein the body comprises aluminum.
32. The apparatus of claim 23 wherein the body comprises a polymer.
33. The apparatus of claim 23 wherein the body is extruded.

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EVIDENCE APPENDIX

Appellants entered no evidence pursuant to §1.130, 1.131 or 1.132, and the Examiner entered no evidence that was relied upon by Appellants.

RELATED PROCEEDINGS APPENDIX

There are no copies of related decisions or proceedings.



US006513856B1

(12) **United States Patent**
Swanson et al.

(10) Patent No.: **US 6,513,856 B1**(45) Date of Patent: **Feb. 4, 2003**

(54) **ROLL-ASSIST MECHANISM FOR TARP SYSTEMS**

(75) Inventors: **Bradford P. Swanson, Yankton, SD (US); Christopher J. McCallum, Yankton, SD (US)**

(73) Assignee: **Shur Company, Yankton, SD (US)**

(*) Notice Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days

(21) Appl No **10/109,492**

(22) Filed **Mar. 28, 2002**

(51) Int. Cl.⁷ **B60P 7/04**

(52) U.S. Cl. **296/98, 296/100.15; 296/100.16**

(58) Field of Search **296/98, 100.15, 296/100.16, 100.18**

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Website article re: www.vulcanspring.com, 2 pages
Website article re: www.sdp-si.com, 2 pages

* cited by examiner

Primary Examiner—D. Glenn Daydon

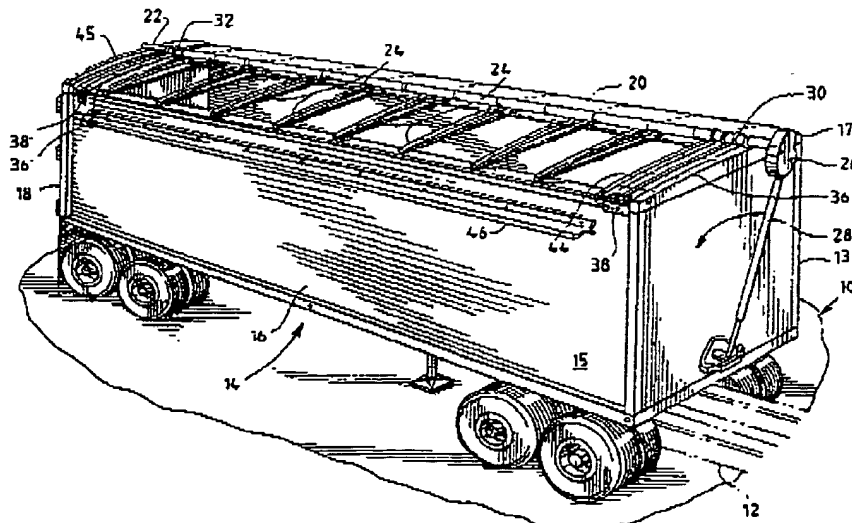
Assistant Examiner—Jason Morrow

(74) Attorney, Agent, or Firm—Jones, Day, Reaves & Pogue

(57) **ABSTRACT**

In a tarp system used to cover an open container such as a truck, the tarp being connected on one longitudinal edge to a roll bar, an improved mechanism for assisting movement of the roll bar comprises one or more constant force springs, each spring attached at one end to a longitudinal side of the container and at the other end to a reel mounted on the roll bar. When the roll bar is at one side of the container, the tarp is rolled around the roll bar and the constant force springs are extended. As the bar rolls across to the opposite side, the tarp is unrolled to cover the container opening, and the constant force springs wind into a coil around the reel.

23 Claims, 5 Drawing Sheets



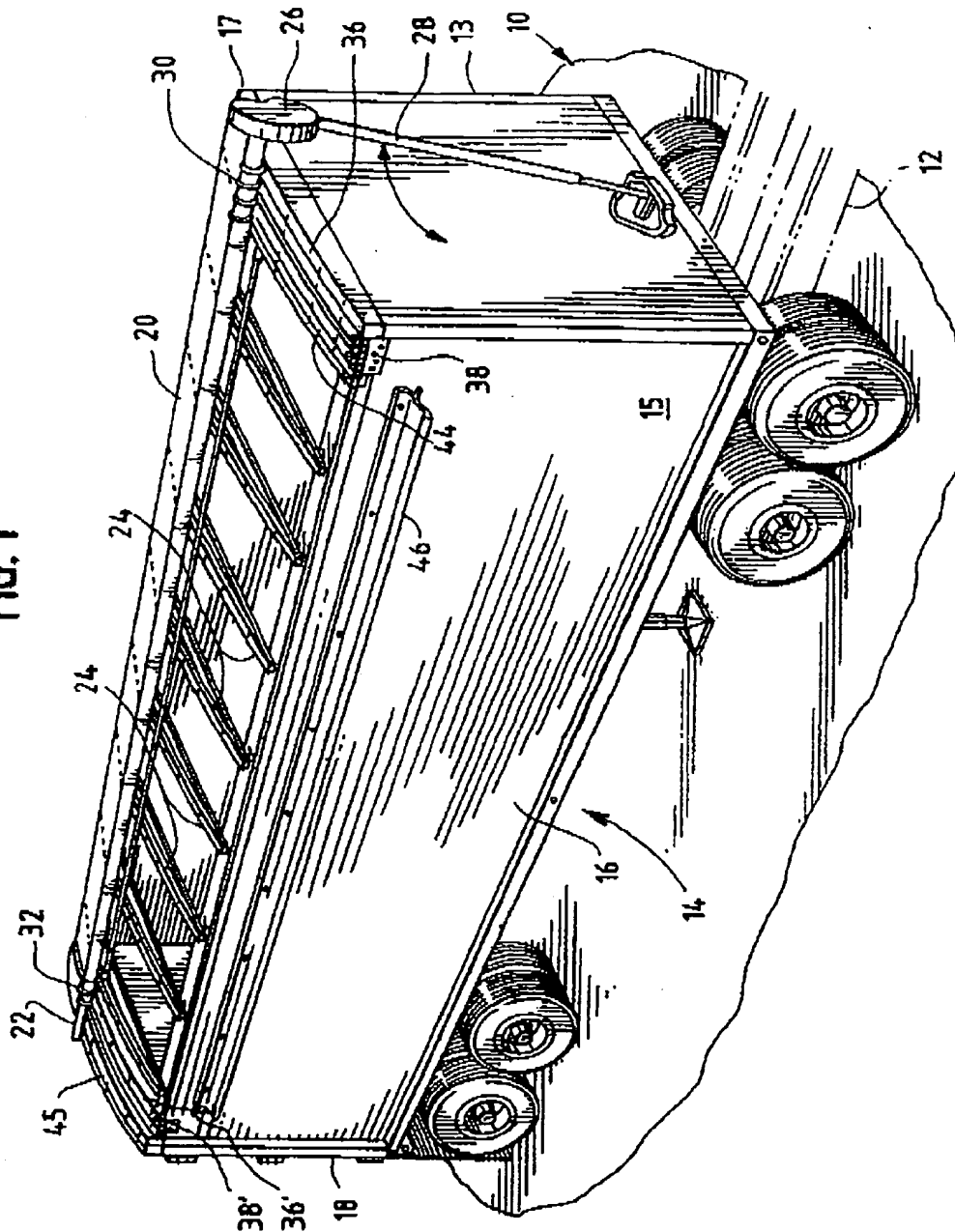
U.S. Patent

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FIG. 1



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FIG. 2

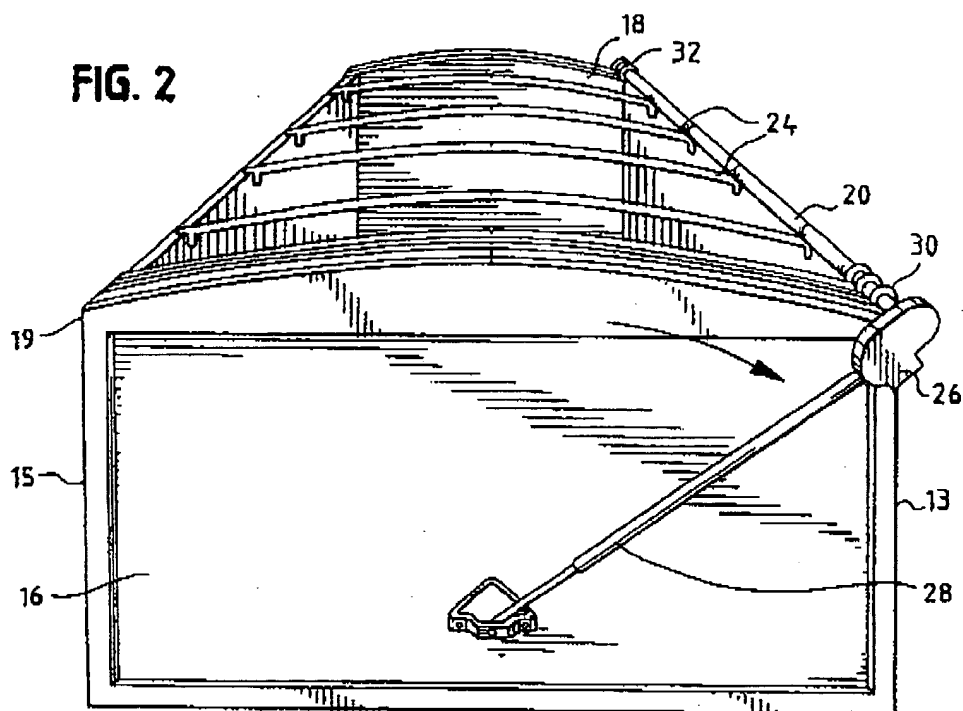
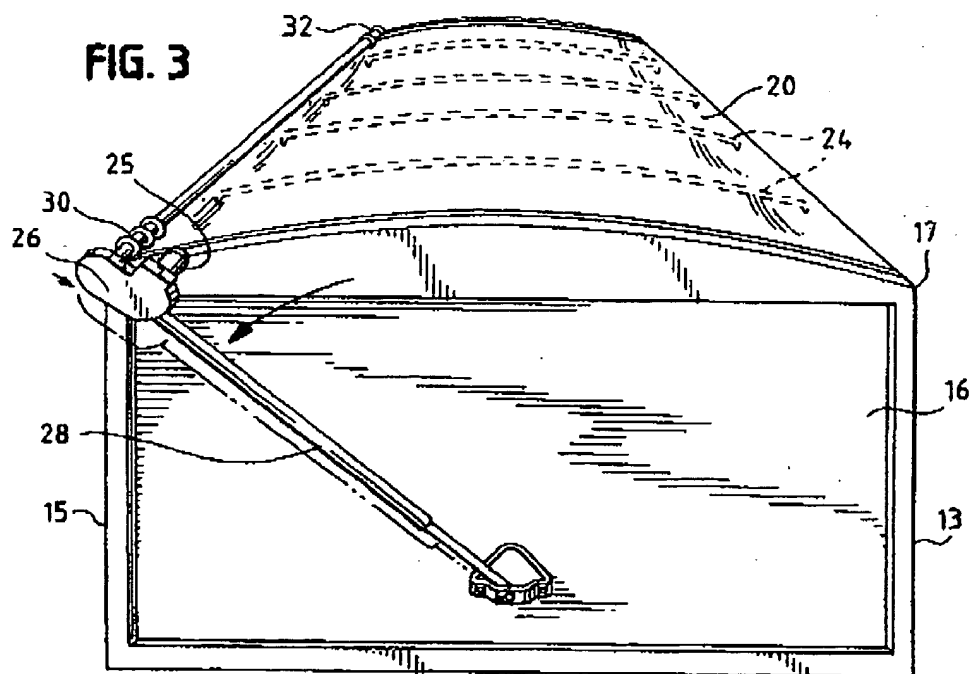


FIG. 3



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FIG. 4

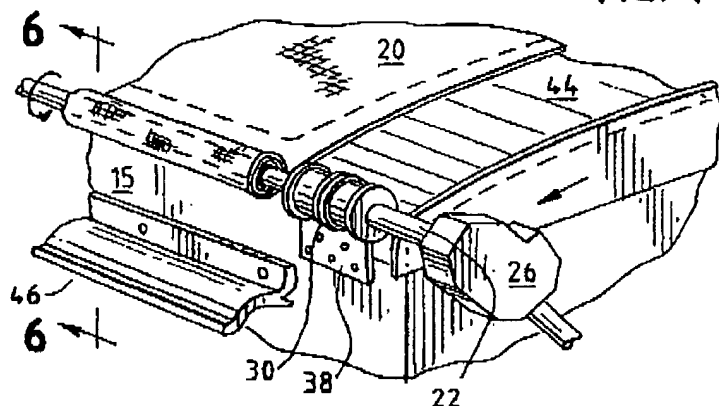


FIG. 5

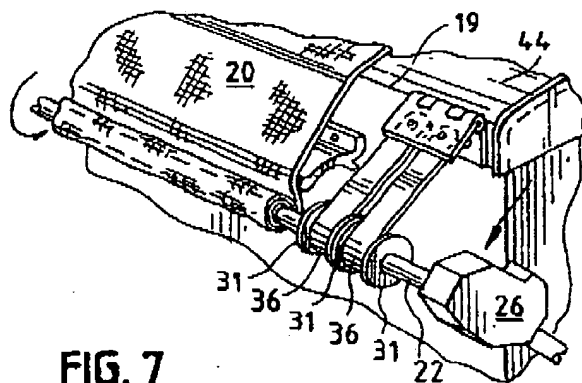


FIG. 7

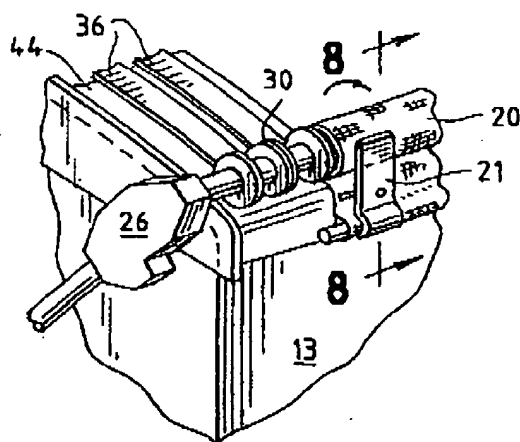


FIG. 6

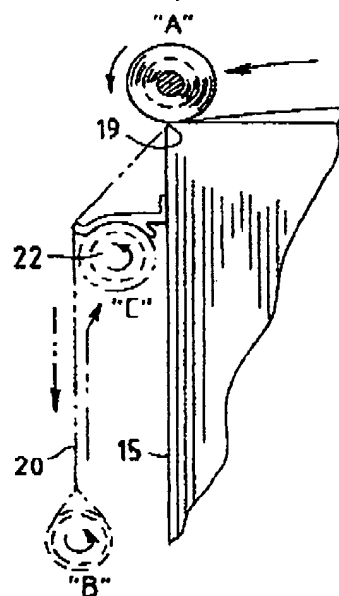
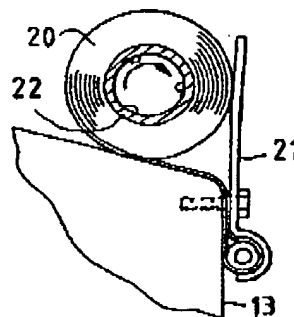


FIG. 8



U.S. Patent

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FIG. 9

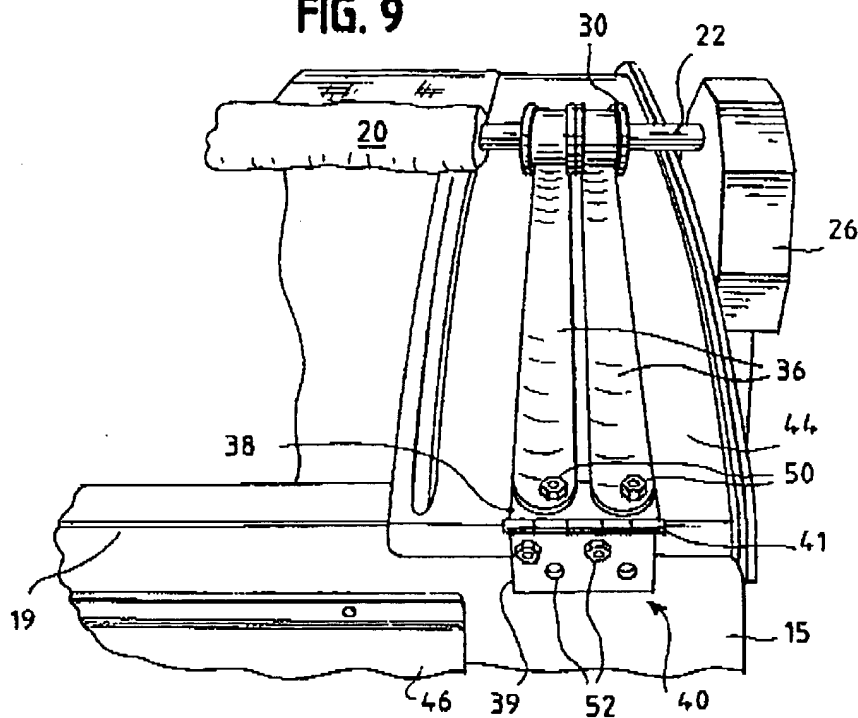
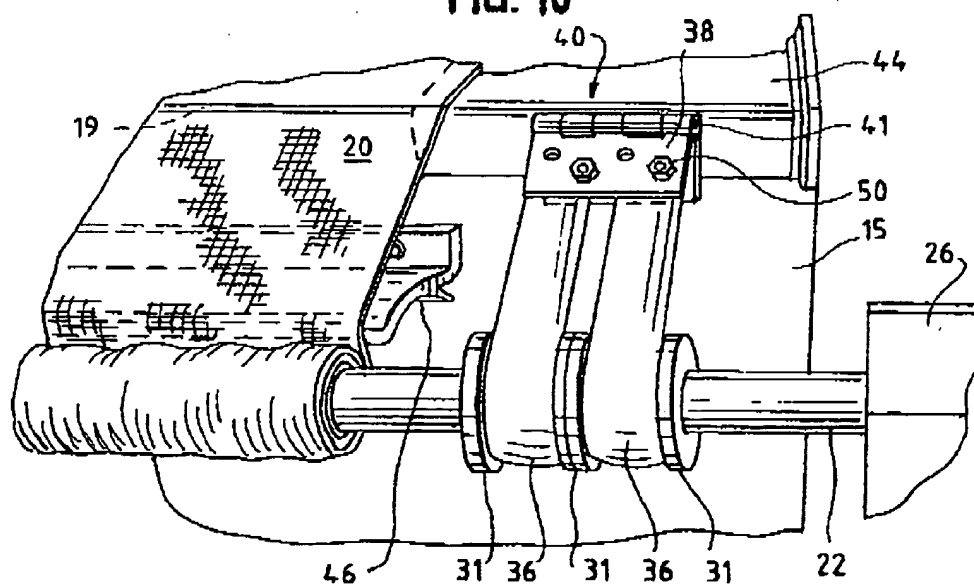


FIG. 10



U.S. Patent

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FIG. 11

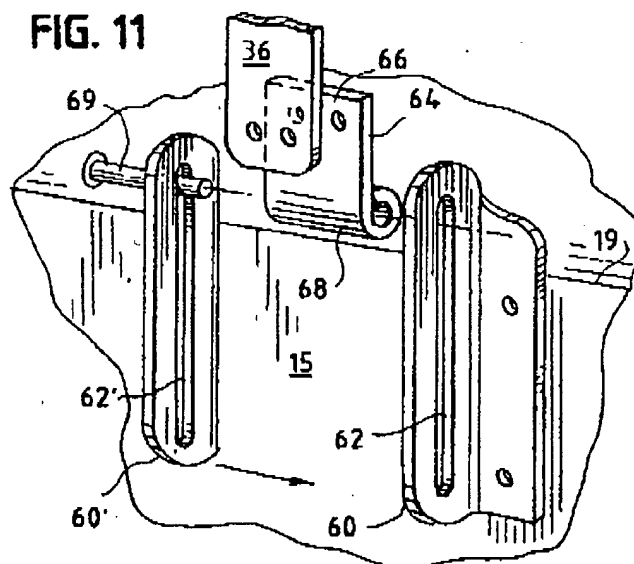


FIG. 12

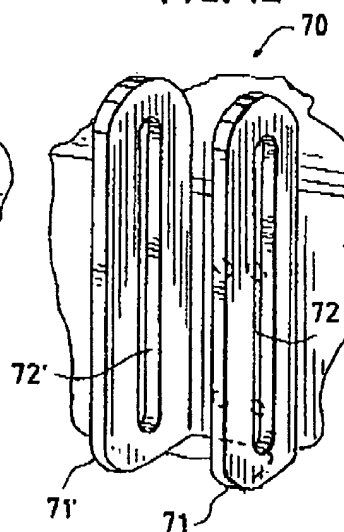


FIG. 13

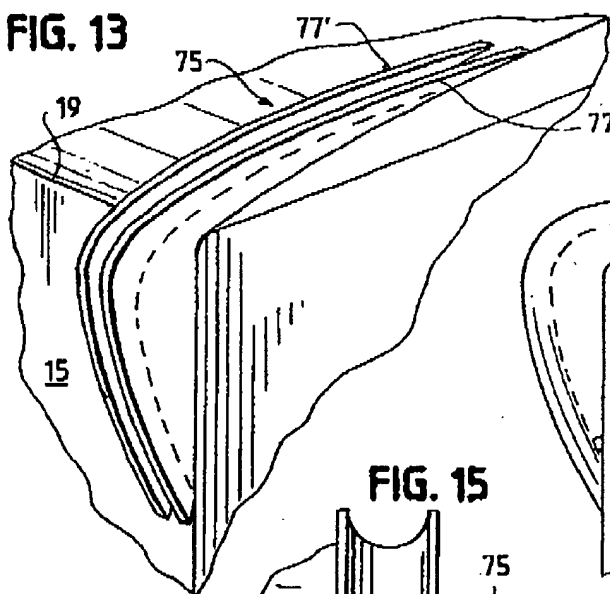


FIG. 14

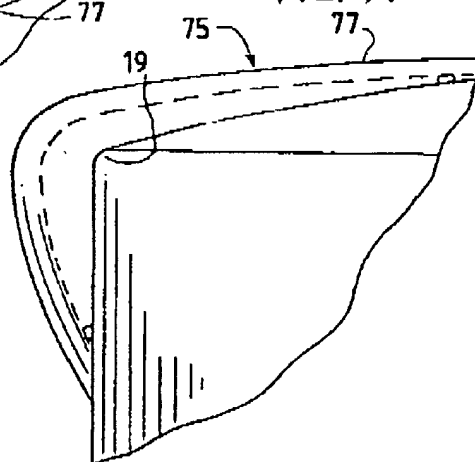
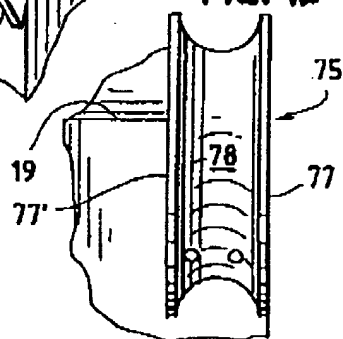


FIG. 15



US 6,513,856 B1

ROLL-ASSIST MECHANISM FOR TARP SYSTEMS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to tarp systems including fabric or other flexible material and associated metal hardware for covering an open top truck box, trailer, other vehicle or stationary container. More particularly, the invention relates to mechanisms for facilitating the rolling or unrolling of flexible material between a rolled up condition and the unfurled condition to cover an opening.

2. Description of the Prior Art

Various types of truck, trailer, trailer and moveable and stationary container bodies are designed to be loaded through an open top. Such bodies are typically used to haul or store hardware, equipment, produce, grain, stone, earth or refuse. It is desirable to use tarpaulins or other coverings to close the open tops of such containers. The tarpaulins serve to shelter the truck, trailer or container contents against the elements and to maintain the contents in the body.

Several systems are known for reversibly covering the open tops of vehicles, boxes and containers with tarpaulins. Typically, the covering is unrolled from a long tube or bar by manipulation of the associated metal hardware. The roll tube or roll bar is moved between an open, rolled-up position in which the covering is wrapped around the tube, exposing the interior of the container, and a closed, unfurled position in which the covering is spread over the top of the container.

Various ways have been employed to move the tube across the opening and to secure the free end near one edge of the vehicle, box or container top. The tube usually is rotated either manually or by an electric motor. These systems tend to use end caps and metal bows spanning the width of the opening to support the covering along the length of the open top.

An example of such a system is shown in U.S. Pat. No. Re. 31,746 issued to Dimmer et al., which is incorporated by reference herein in its entirety. As shown in the patent, a covering is attached along one lengthwise edge to a tube. One end of the tube is connected by a universal joint to a crank. The universal joint is reversibly attached to the roll tube by a spline and pin or similar mechanism.

An operator at ground level can turn the crank causing the tube to roll over the top of the container, such that the covering rolls up lengthwise on the tube. As a result, the material will uncover or cover the top of the trailer or container. In this arrangement, the end of the roll tube to which the universal joint and crank arm are attached can be described as the active end because the torque or turning force is applied there. Conversely, the opposite end can be described as the passive end because the torque is applied indirectly through the length of the tube.

A feature of the system shown in U.S. Pat. No. Re. 31,746 (and the commercial embodiment thereof) is an elastic cord (item 78) attached at one end to a narrower plastic tube within the roll tube or roll bar and at the other end to a forward edge of the latch plate (or, alternatively, to the body itself). (See U.S. Pat. No. Re. 31,746, column 4, lines 49-66.) When the roll tube is rolled across the top, the elastic cord pulls the passive end of the tube toward the latching side of the container to tension the end of the roll bar opposite the direct rolling force provided on the active end by the crank. Generally, the tensioning force is greatest when

the roll bar is in the open position; this force decreases as the roll bar is moved closer to the latching side.

Another example of a tarp system is disclosed in U.S. Pat. No. 5,487,584, also incorporated by reference herein in its entirety.

Although the use of a resilient cord is intended to assist movement of the passive end of the roll tube, it has some disadvantages. For example, the resilient cord applies variable force as the roll bar moves across the opening. In essence, as the cord is stretched it applies an increasing force at one end of the bar in a different direction than the turning/rolling force applied directly by the crank arm at the opposite end. Also, the elastic cord stretches out over time, loses its pulling force, and is subject to being cut or breaking as a result of overuse or exposure to the elements.

During the opening operation, an imbalance of forces applied at the opposite ends of the roll bar can cause the covering material to be wrapped more tightly around one end of the bar or tube than the material on the other end. This will result in one end progressing more slowly than the other end. As a result, one end of the roll tube tends to advance faster than the other end during opening or closing operations, occasionally resulting in stationary unwinding of the covering from the bar at one end. Such uneven rolling may cause the operator to try to use the crank arm to slide, push or pull one end of the roll bar and associated covering material to advance it to a position even with the other end.

It is an object of the invention to provide an assist mechanism for a rolling tarp system whereby a more even winding or unwinding of the covering on the roll bar is achieved. It is another object of the invention to provide an apparatus where uneven rolling or unrolling is less likely to occur or is avoided altogether. It is a further object of the invention to provide a mechanism that assists with even progression of the two roll bar ends as the bar is rolled across the opening of a vehicle, box or container. Still further it is desirable to provide an assist mechanism that may be retrofitted readily to existing covering apparatus to improve the rolling operation. It is yet another objection of the invention to eliminate the disadvantages of use of the elastic cord, such as fraying, breaking, or loss of elasticity.

SUMMARY OF THE INVENTION

The present invention is an improvement for a tarp system for an open top container, wherein the tarp has first and second longitudinal edges and the container has first and second longitudinal sides, the tarp being attached on one longitudinal edge to the first longitudinal side of the container and on the other longitudinal edge to a roll bar. The roll bar is caused to roll by a force applied on at least one end of the bar. The improvement relates to a mechanism for assisting movement of the roll bar across the opening of the container.

The improvement comprises a roll assist apparatus including at least one reel fixedly attached to one end of the roll bar and a constant force spring having a first end fixedly attached to the reel and a second end attached to the second longitudinal side of the container. The roll bar is adapted to roll across the top of the container between the first and second longitudinal sides. When the roll bar is at the first side of the container, the tarp is rolled around the roll bar so that the top opening of the container is uncovered, and the constant force spring is extended. As the roll bar rolls toward the second longitudinal side of the container, the tarp unfurls to cover the top opening side of the container, and the constant force spring winds into a coil around the reel.

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The constant force spring, by its nature, is biased to wind up on itself. This force tends to pull the tarp toward the unfurled position. Unlike a stretch cord, which has an increasing force as the roll bar moves away from the unfurled position, the force applied to the roll bar by the constant force spring is relatively constant over its length. The spring also is highly durable and unstretchable.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other novel features and advantages of the invention will be better understood upon a reading of the following detailed description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a right front perspective view of a trailer shown with a tarp system having a roll assist mechanism constructed in accordance with the principles of the invention, the tractor being partially shown.

FIG. 2 is a front perspective view of a trailer container with the inventive roll assist system in a rolled-up position such that the container opening is uncovered.

FIG. 3 is a front perspective view of a trailer container with the inventive roll assist system in an unfurled position such that the container opening is covered.

FIG. 4 is a partial right front perspective view of the container showing the roll assist system in a nearly unfurled position;

FIG. 5 is a view similar to FIG. 4 but illustrating the roll assist system in a more fully unfurled position;

FIG. 6 is a cross-sectional view taken substantially along the line 6—6 of FIG. 4, and further showing the roll bar in different positions in phantom lines;

FIG. 7 illustrates a partial left front perspective view of a front upper corner of the trailer showing the constant force springs in an extended condition and the tarp in a completely rolled-up condition;

FIG. 8 is a cross-sectional view taken substantially along the line 8—8 of FIG. 7;

FIG. 9 is a side perspective view of an upper portion of the front of the trailer showing the springs in a partially extended condition;

FIG. 10 is a side perspective view of an upper portion of the front of the trailer showing the tarp as fully covering the trailer;

FIG. 11 is a side view of an alternative embodiment of the hinge and mounting for the constant force spring.

FIG. 12 is a second alternative embodiment of the hinge mounting;

FIG. 13 is a perspective view of a corner track for receiving the extended constant force spring over the trailer container to prevent back load on the constant force spring at the edge of the container.

FIG. 14 is a side view of the corner track shown mounted on the trailer container, partially showing the container and end cap, and;

FIG. 15 is a front view of the corner track.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, and initially to FIGS. 1-3, a tractor trailer is partially shown in perspective and designated generally by the reference numeral 10. The tractor trailer 10 comprises a truck tractor 12 adapted to connect to and pull a trailer 14 as well known in the art. The trailer

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includes an open-top container 16 particularly suitable for hauling materials such as grain, earth, refuse, or the like, which materials generally are loaded into the container 16 through the open top. The loaded material may be removed from the container 16 through a trap door in the floor (not shown) or through rear doors 18. Container 16 has a first longitudinal side 13 having a top edge 17, and a second longitudinal side 15 having a top edge 19. A similar trailer construction is shown in U.S. Pat. No. Re. 31,746, the disclosure of which is incorporated herein in its entirety.

The illustrated container 16 is provided with a cover system to protect the contents from the elements such as rain, sleet, snow, and to ensure that they are retained within the container 16 during high winds produced by weather or by movement of the trailer 14. The covering system includes a tarp 20 which may be constructed of vinyl, canvas or other flexible materials. Tarp 20 is generally of the same size and shape as the opening of container 16, and has first and second longitudinal edges. One longitudinal edge of tarp 20 is secured to a first longitudinal edge 17 of container 16 by metal hardware known in the art. (See, for example, U.S. Pat. No. Re. 31,746). The second longitudinal edge of tarp 20 is secured to a roll bar or tube 22. Roll bar 22 is substantially the same length as container 16. Suitable bows 24 span the width of the container 16 at spaced intervals to support the tarp 20 over the container 16 when the tarp is unfurled. In FIG. 1, tarp 20 is shown partially unfurled over the top of container 16.

In one preferred form of the covering system, an electrically operated drive assembly is used to roll the roll bar 22 back and forth between longitudinal edges 17 and 19 of container 16, and thus roll up or unroll the tarp 20 over the container 16. The drive assembly comprises preferably a 12 volt DC electric motor 25 (FIG. 3) connected to a gear reduction mechanism 26 to which the roll bar 22 is attached. The motor 25 and gear reduction mechanism 26 are supported on a telescoping tube assembly 28 that is pivotally attached to the front of the container 16. As illustrated in FIGS. 1-3, an operator may activate the motor 25, which is preferably of a reversible type, to roll the roll bar 22 from edge 19 to edge 17, causing the tarp 20 to be rolled up on the roll bar 22 thereby uncovering the container 16. When rolled in the opposite direction the tarp 20 is unfurled to cover the open top.

In accordance with the invention, the rolling motion of the roll bar across the top of the container is facilitated by one or more constant force springs. As known in the mechanical arts, the term "constant force spring" is used to describe a strip of flat material that has been wound to a given curvature so that in its relaxed condition it is in the form of a tightly wound coil or spring. When deflected, the spring material straightens as it leaves the coil. The straightened length of spring stores the spring's energy through its tendency to assume its natural radius.

The illustrated embodiment of a roll assist system includes a double reel member 30 fixedly attached to the forward end of the roll bar 22 and a single reel member 32 fixedly attached to the rearward end of the roll bar 22. The reels 30, 32 may be formed from suitable metallic materials, molded thermoplastic, or other plastic materials. A pair of constant force spring members 36 in the form of substantially flat flexible strips are fixedly attached at one end thereof to the double reel member 30. Similarly, a single constant force spring member 36' is fixedly attached to the single reel member 32. The opposite ends of the constant force spring members 36 and 36' are attached to hinge plates 38 and 38', mounted on container side 15 with hinge pins 41.

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aligned with longitudinal edge 19 (FIGS. 4, 5). Alternative means for pivotably mounting the ends of the springs to container side 15 are discussed below.

Preferably the constant force spring members 36, 36' suitable for use in the instant invention are made from a high yield metal such as 301 stainless steel and having a constant pull force of about 30 pounds, although the invention is not so limited. The two springs 36 at the forward end of the container 16 are effective to assist movement of tarp 20, motor assembly 25, and gear reduction mechanism 26. It can be appreciated that a single, larger spring would be an effective alternative.

As the constant force spring 36 is unwound from the reel 30, its tendency is to coil back up on itself on the reel. The pull back force depends on the material thickness and width as well as how it is wound. Constant force springs which can be used in the practice of the invention are commercially available from John Evans' Sons, Inc. of Lansdale, Pa., and other suppliers.

In a preferred embodiment, each 301 stainless steel constant force spring is approximately 0.022 inches thick and about 4.00 inches wide. Typically, the spring is long enough to at least span the width of an opening of a standard trailer container, i.e., the distance between first longitudinal edge 17 and second longitudinal edge 19. A spring with these specifications can be made to exert an approximately constant force of 33 lbs. on the roll bar 22 in the direction of side 15. This 33 lbs. force does not vary significantly as reels 30, 32 are rolled from one side of the opening to the other.

The reels 30, 32 preferably each have a 2 inch cylindrical hole which mates with the 2 inch diameter roll bar 22 to which it is attached in ways well known in the art. Preferably, the reels have flanges 31, which are preferably about five inches apart, one inch more than the four inch width of the springs 36, 36' to accommodate the spring and to assure that the spring is evenly wound onto itself. The flanges 31 are preferably about 1/2 inch thick. The distance from the outside of one flange to the outside of the other, therefore, is 6 inches in the preferred embodiment. Typically, the flanges are about one inch deep, a depth that assures that the flanges will be at least as high off the reel as the spring when it is completely wound around the reel.

The operation of the roll assist system now can be appreciated with reference to FIGS. 4-6 which illustrate the roll bar 22 with forward double reel member 30 in various positions together with the constant force spring members 36 in various extended and retracted positions. An aspect of the invention is that the container 16 preferably is provided with forward and rearward panel members or end caps 44 and 45 (see FIG. 1) which are helpful in supporting the springs 36 and 36', respectively, when the tarp 20 is in the rolled up condition and the springs are extended. These end caps 44, 45 cover opposed ends of the container 16 and may be of a sheet metal material or can even be formed of the same flexible material as the tarp 20.

FIGS. 4-6 illustrate the roll assist system in a position wherein the tarp 20 is in a nearly completely unfurled position (FIG. 4, FIG. 6, position A) and in a more fully unfurled position (FIG. 5, also illustrated in phantom in FIG. 3). In the fully unfurled position the hinge plates 38, 38' to which the spring members 36 are fixedly attached rotate and allow the roll bar 22 to seat underneath a longitudinal latch plate or ledge 46 (FIG. 6, position C) attached on side 15 near second longitudinal edge 19 of the container 16.

FIGS. 7 and 8 illustrate the roll bar 22 with the tarp 20 fully wound thereon, thereby opening the top of the con-

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tainer 16. In this position of the roll bar 22, the constant force spring members 36 are fully deployed from the reel member 32 and extend across the full width of the end cap 44 and container 16. The rolled tarp 20 abuts stop member 21 mounted to side 13 and extending above edge 17 of container 16.

FIGS. 9 and 10 illustrate in detail the construction and function of the hinge plate 38 which is essentially identical to the structure and function of hinge plate 38'. Each hinge plate 38 comprises a first plate portion 39 fastened by suitable screws or rivets 52 to the side 15 of the container 16, and a second plate portion 40 that rotates relative to first plate portion 39 along hinge pin 41. Hinge pin 41 is substantially aligned with edge 19 of side 15. Constant force spring members 36 are each fastened by suitable screws or rivets at one end thereof to second plate portion 40. When the constant force spring members 36 are in an extended condition, as shown in FIG. 9, the second plate portion 40 is open and lays across the top of end cap 44, allowing the spring members 36 to be supported on the end cap 44. When the tarp 20 is more fully unwound from the roll bar 22, as shown in FIGS. 5 and 10, the second plate portion 40 pivots about hinge pin 41 and nearly closes against first portion 39. Roll bar 22 drops past ledge 46 until the tarp is completely unwound and roll bar 22 is in the lowest of the three positions illustrated in FIG. 6 (position B). The roll bar 22 then moves back upward and the tarp 20 rewinds on the roll bar 22, until the roll bar 22 is engaged underneath latchplate or ledge 46, also shown in FIG. 6 (position C). Preferably, longitudinal latchplate or ledge 46 is about four inches, below edge 19, and the lowest position C of FIG. 6 is about 18 inches below edge 19.

FIGS. 11 and 12 illustrate alternative embodiments of means for pivotably mounting an end of a constant force spring to a side of the container. As illustrated in FIG. 11, two stationary brackets 60, 60' of L-shaped cross-section each have a slot 62, 62' in one side thereof. Stationary brackets 60, 60' are mounted to the outer surface of container 16 such that slots 62, 62' are in vertical parallel alignment with one another and extend outwardly from the container side. The upper portions of the slots 62, 62' extend above edge 19 of container wall 15. A sliding bracket 64 has a first flail end 66 adapted to be fixedly connected to the end of constant force spring 36 and a second end in the form of a substantially closed loop 68. Pin 69 is of sufficient length and appropriate diameter to extend through slot 62', substantially closed loop 68, and slot 62. Sliding bracket 66 can slide up and down along slots 62, 62', providing pivotable and vertical movement of the end of constant force spring 36. When sliding bracket 66 is at the bottom of slots 62, 62', roll bar 22 will be seated underneath longitudinal latchplate or ledge 46 (FIG. 6, position C), and when sliding bracket 66 is at the top of slots 62, 62', bracket 66 can rotate to allow constant force spring 36 to extend over the opening of container 16.

FIG. 12 illustrates an alternative configuration of stationary brackets 60, 60'. U-shaped bracket 70 has two parallel legs 71, 71', each being provided with a slot 72, 72'. When bracket 70 is mounted to a side of container 16, slots 72 and 72' will be in vertical parallel alignment with one another. A sliding bracket 66 with pin 69 as shown in FIG. 11 can be attached at one end to an end of constant force spring 36 and move vertically between the legs 71, 71' of bracket 70, while allowing pivoting of the end of the spring.

FIGS. 13-15 illustrate an alternative to the disclosed hinge constructions. End cap 44 is provided at the side 15 of the container 16 with a corner track element 75. Corner track

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element 75 is secured at its lower end with mounting means 76, which will be below latchplate 46. Corner track element 75 is also secured at its upper end and to end cap 44 with similar mounting means, not shown. Corner track element 75 comprises side rails 77, 77 disposed on either side of track 78, which is preferably of concave cross-section. Corner track element 75 is disposed directly over reel 30 when the tarp 20 is completely unfurled as illustrated in FIG. 5. Constant force spring 36 is mounted directly to side 15 of the container below corner track element 75. As the roll bar 22 is moved to wind up tarp 20 and uncover the top of container 16, constant force spring 36 unwinds from reel 30 and is guided by corner track element 75 into proper position over end cap 44. Side rails 77, 77 of corner track 75 are spaced from one another so as to extend on either side of constant force spring 36 as spring 36 unrolls.

It can now be appreciated that a roll assist system constructed according to the invention provides a highly effective means for assisting in both rolling up and unrolling a tarp evenly across the length of a roll bar. Thus, the need for an operator to manually push or pull the active end of the roll bar to adjust or straighten the tarp is minimized or eliminated altogether, without the disadvantages of using a stretch cord.

While the present invention has been described in connection with preferred embodiments thereof, it will be apparent to those skilled in the art that many changes and modifications may be made without departing from the true spirit and scope of the present invention. Accordingly, it is intended by the appended claims to cover all such changes and modifications as come within the spirit and scope of the invention.

What is claimed is:

1. A roll tarp system for an open top vehicle or container, the system comprising:

a roll bar,

a flexible material having dimensions approximately matching the dimensions of the open top, the flexible material having first and second longitudinal edges, the flexible material attached along one longitudinal edge to the vehicle or container and along the other longitudinal edge to the roll bar,

a reel fixedly attached to the roll bar,

a constant force spring having a first end fixed to said reel such that the spring is windable thereon, and having a second end mounted to the vehicle or container;

whereby rolling of the roll bar in one direction winds the spring onto the reel and rolling the roll bar in the other direction unwinds the spring from the reel.

2. The roll tarp system of claim 1 wherein the roll bar has two ends, and further comprising an electric motor at one end.

3. The roll tarp system of claim 2 wherein the reel is located near the end of the roll bar where the electric motor is located.

4. The roll tarp system of claim 3 further comprising:

a second reel, the second reel being located near the end of the roll bar opposite where the electric motor is located, and,

a second constant force spring having two ends, one end attached to the second reel and the other attached to the vehicle or container.

5. The roll tarp system of claim 4 further comprising:

a third reel, the third reel located near the end of the roll bar where the electric motor is located, and,

a third constant force spring having two ends, one end attached to the third reel and the other attached to the vehicle or container.

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6. The roll tarp system of claim 5 further comprising means for pivotally mounting an end of at least one of the springs to the vehicle or container.

7. The roll tarp system of claim 6 wherein said means comprises a hinge.

8. A roll tarp system for an open top vehicle or container, the opening having longitudinal and widthwise dimensions and edges at its perimeter, the system comprising:

a roll bar having first and second ends;

a flexible material having longitudinal and widthwise dimensions approximately matching the dimensions of the open top, the flexible material attached along one longitudinal edge near to a longitudinal edge of the opening, the flexible material being attached along its opposite longitudinal edge to the roll bar,

means for rolling the roll bar attached to the first end of the roll bar,

a reel attached to the roll bar, and,

a constant force spring adapted for winding on the reel, the spring having length approximately matching the widthwise dimension of the opening, the spring being attached at one end to the reel, and the spring being mounted at the other end to the vehicle or container,

whereby rolling the roll bar in one direction will wind the spring on the reel while unwinding the flexible material from the roll bar, and rolling of the roll bar in the opposite direction will unwind the spring from the reel while winding the flexible material onto the roll bar.

9. The roll tarp system of claim 8 wherein the means for rolling the roll bar is a crank.

10. The roll tarp system of claim 9 wherein the crank is attached to the roll bar by a universal joint.

11. The roll tarp system of claim 8 wherein the means for rolling the roll bar is an electric motor.

12. The roll tarp system of claim 8 further comprising means for pivotally mounting an end of at least one of the springs to the vehicle or container.

13. The roll tarp system of claim 12 wherein said means comprise a hinge.

14. The roll tarp system of claim 8 wherein the first reel is located near an end of the roll bar, and further comprising:

a second reel, the second reel being attached to the roll bar near the other end thereof; and,

a second constant force spring adapted for winding on the second reel, the spring having length approximately matching the widthwise dimension of the opening, the spring being attached at one end to the second reel and at the other end to the vehicle or container,

whereby rolling the roll bar will wind the second spring on the second reel.

15. The roll tarp system of claim 14 further comprising:

a third reel, the third reel being attached to the roll bar near the end where the means for rolling is located, and,

a third constant force spring adapted for rolling on the third reel, the third spring having length approximately matching the widthwise dimension of the opening, the third spring being attached at one end to the third reel and at the other end to the vehicle or container,

whereby rolling of the roll bar will wind the third spring on the third reel.

16. A roll tarp system for reversibly covering an open top of a vehicle or container, the roll tarp system including a roll bar having first and second ends, a flexible material approximately matching the dimensions of the opening, the flexible material attached along one longitudinal side to the roll bar

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and along another longitudinal side to the vehicle or container, and means for rolling the roll bar attached to the first end of the roll bar to roll the roll bar along the opening of the vehicle or container, thereby to wind and unwind the flexible material on the roll bar, the improvement comprising:

- a reel attached near an end of the roll bar; and,
- a constant force spring having length approximately matching the widthwise dimension of the opening and adapted to be wound upon the reel, the spring attached at one end to the reel and at the other end by mounting means to the vehicle or container,

whereby rolling the roll bar in one direction will wind the spring on the reel and rolling the roll bar in the opposite direction will unwind the spring from the reel.

17. The roll tarp system of claim 16 wherein the means for rolling the roll bar is an electric motor and the reel is attached to the first end of the roll bar.

- 18. The roll tarp system of claim 16 further comprising, a second reel attached near an end of the roll bar, and, a second constant force spring having length approximately matching the widthwise dimension of the opening and adapted to be wound upon the second reel, the second spring attached at one end to the second reel and at the other end to the vehicle or container.

- 19. The roll tarp system of claim 18 further comprising, a third reel attached near an end of the roll bar, and,

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- a third constant force spring having length approximately matching the widthwise dimension of the opening and adapted to be wound upon the third reel, the third spring attached at one end to the third reel and at the other end to the vehicle or container,

wherein the third reel is located near the second end of the roll bar.

20. The roll tarp system of claim 16 wherein said mounting means comprises a hinge attached between the spring and the container.

21. The roll tarp system of claim 20 wherein said hinge comprises a first plate portion mounted to said container, and a second plate portion pivotably attached to said first plate portion, an end of said spring being fixedly secured to said second plate portion.

22. The roll tarp system of claim 20 wherein said hinge comprises a pivoting bracket slidably mounted to at least one stationary bracket, an end of said spring being fixedly secured to said pivoting bracket.

23. The roll tarp system of claim 16 wherein said mounting means comprises means for directly mounting an end of said spring to said container, said system further comprising a corner track means mounted at the corner of the top and side of the container, to facilitate winding and unwinding of said spring at said corner.

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United States Patent [19]

Miller et al.

[11] Patent Number: 5,984,400
[45] Date of Patent: Nov. 16, 1999

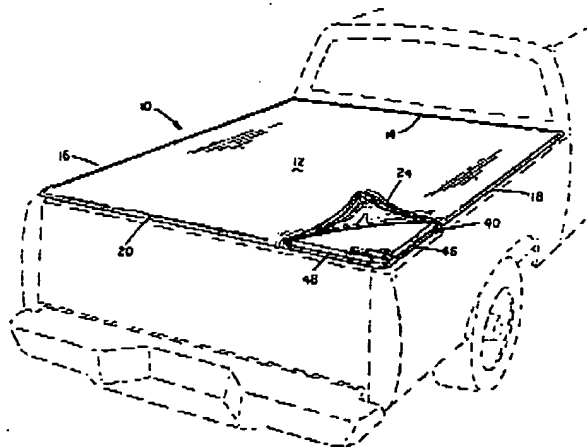
- [54] SYSTEM FOR COVERING THE BED AND BOX OF A PICK-UP TRUCK, WAGON OR TRAILER
- [75] Inventors Robert D. Miller, Norman; Jeffrey M. Nett, Tuttle, Jamie A. Nett, Norman, all of Okla.; Larry J. Thomsen, Maple Lake, Minn.; Michael J. Sterling, Chon Rapids, Minn.; Randall S. Narlock, St Francis, Minn.
- [73] Assignee Lund Industries, Inc., Anoka, Minn.
- [21] Appl No: 08/958,936
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- [52] U.S. Cl. 296/100.15, 296/100.16, 296/100.18
- [58] Field of Search 296/100.15, 100.16, 296/100.17, 100.18, 160/371
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[57] ABSTRACT

A system for covering the box and bed of a pick-up truck includes a tarp, a pair of side rails, an end rail and a cam latch associated with each side rail. The tarp includes beads associated with its edges. These beads cooperate with slots in the rails to fix the edges of the tarp to the rails. The cam latches are provided to interact with the end rail to stretch the tarp and help secure it in place over the bed and box of the pick-up truck.

16 Claims, 6 Drawing Sheets



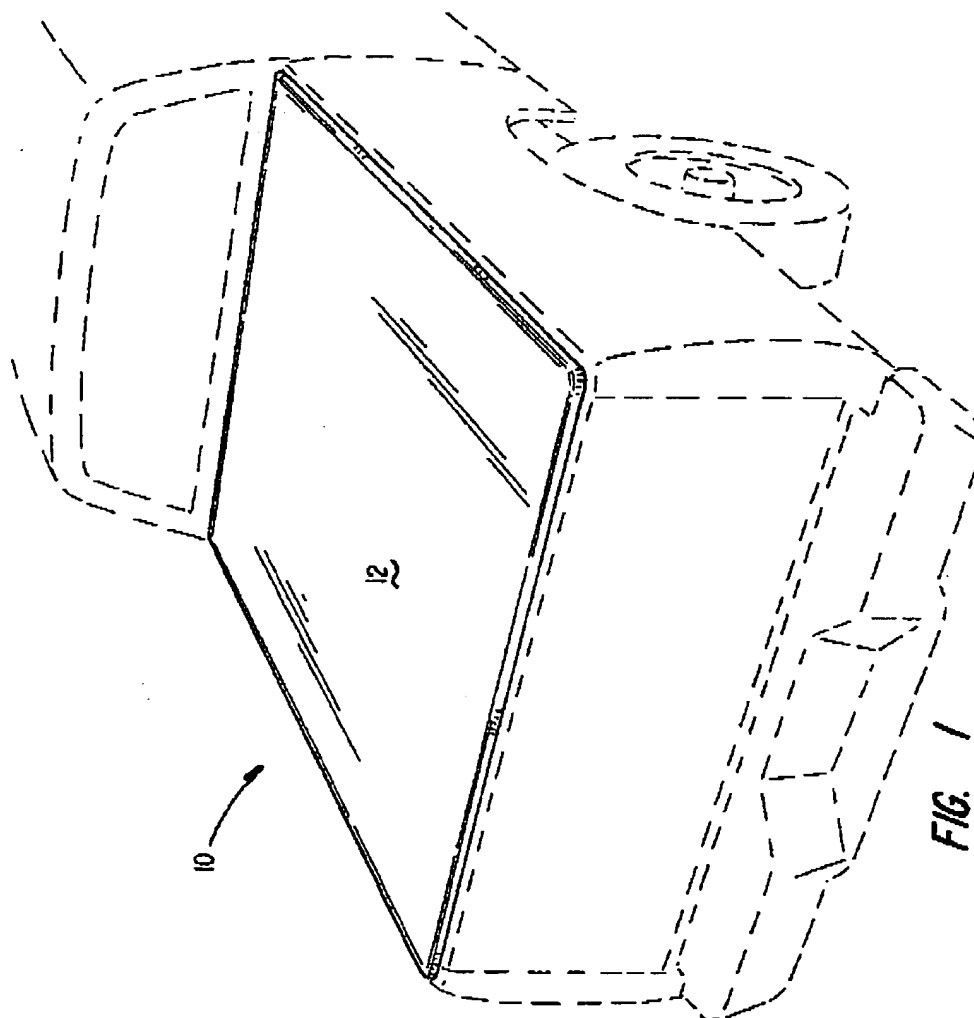
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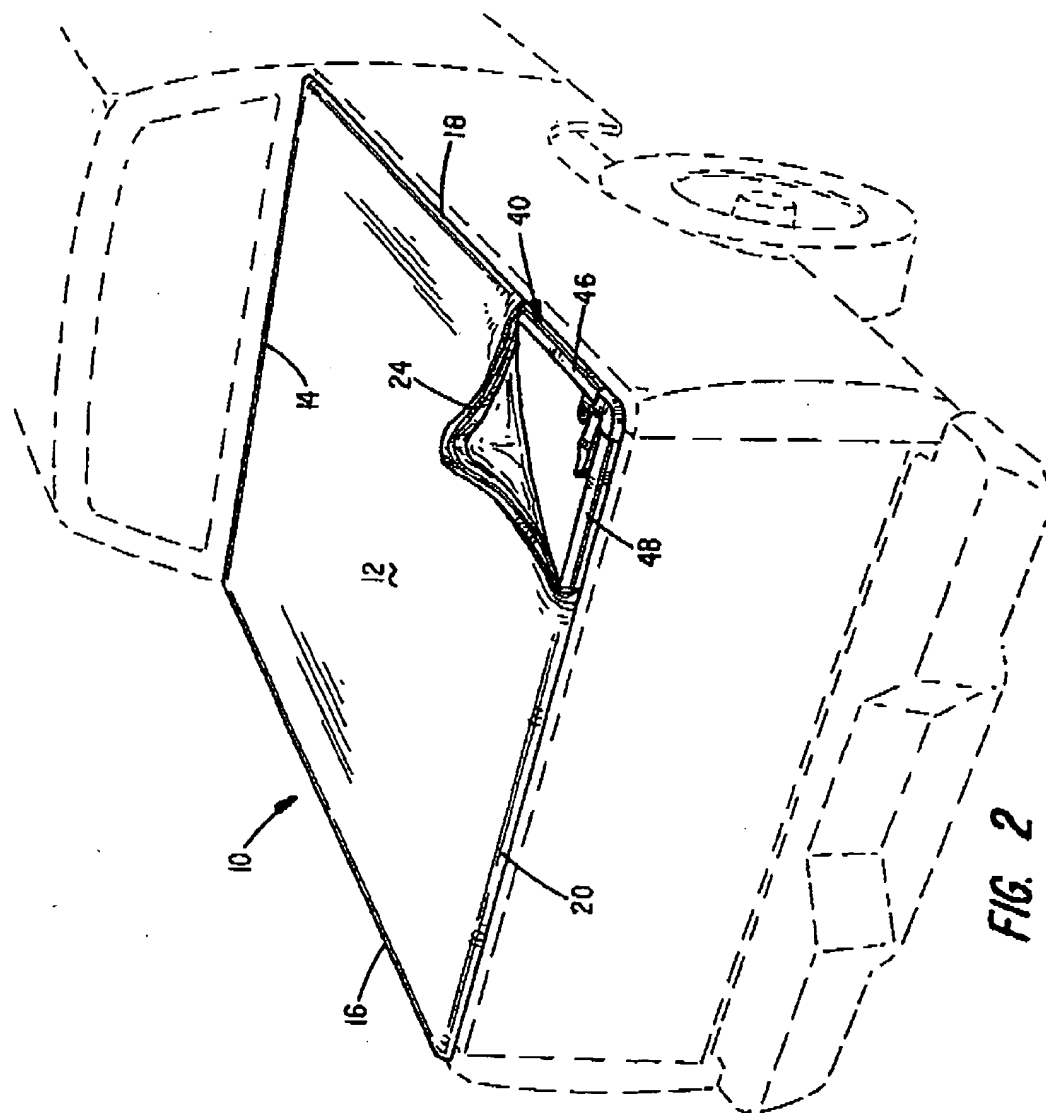


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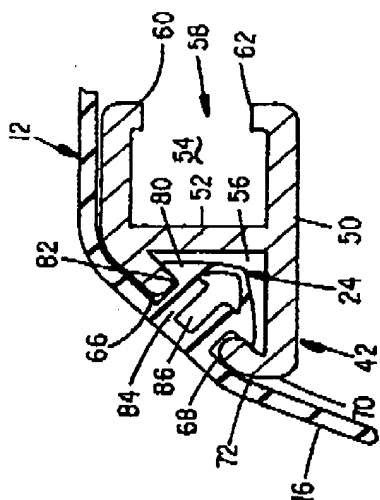


FIG. 4

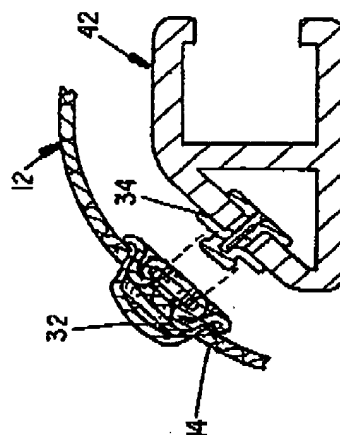


FIG. 6

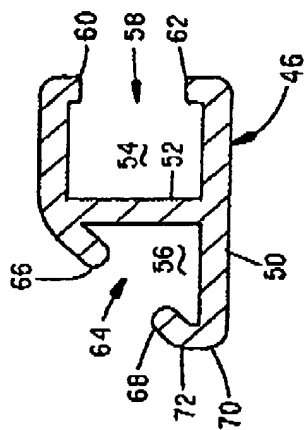


FIG. 3

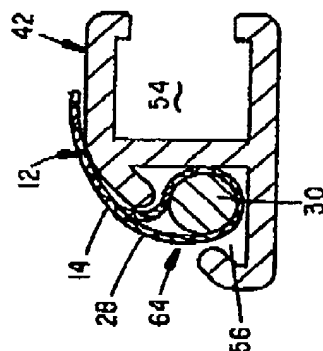


FIG. 5

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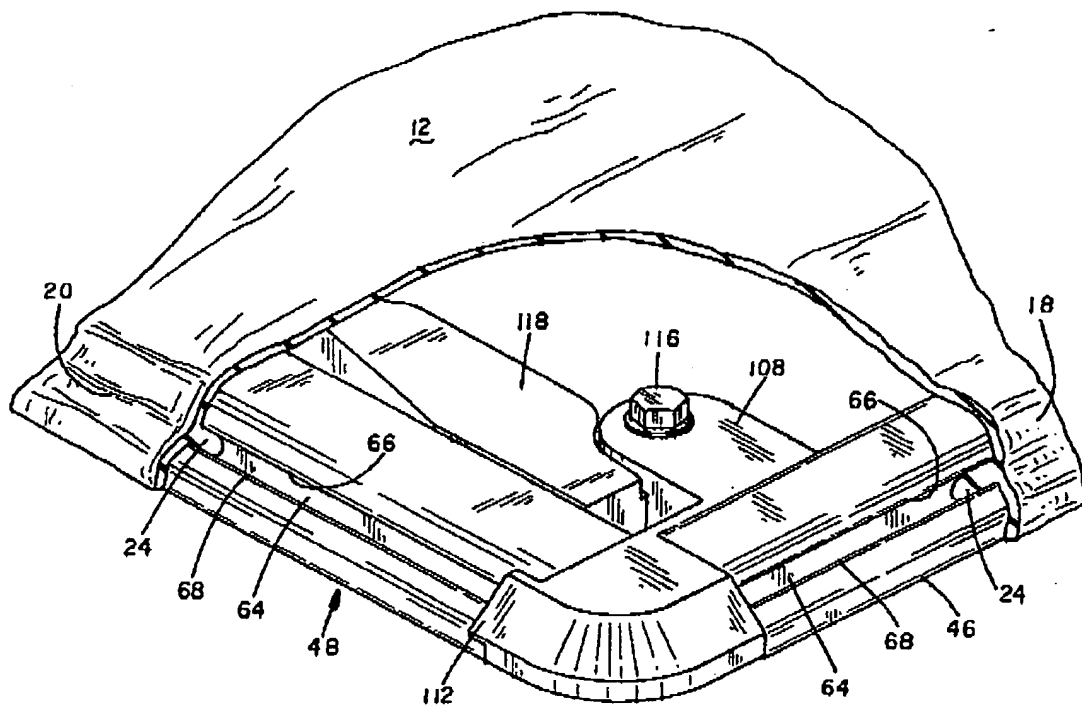


FIG. 8

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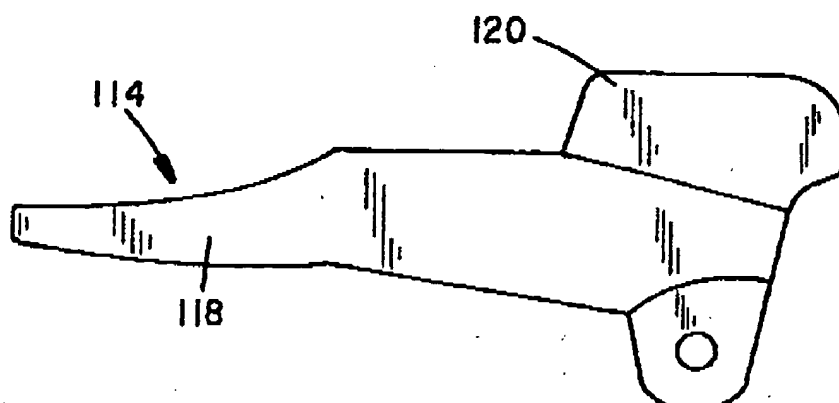


FIG. 9

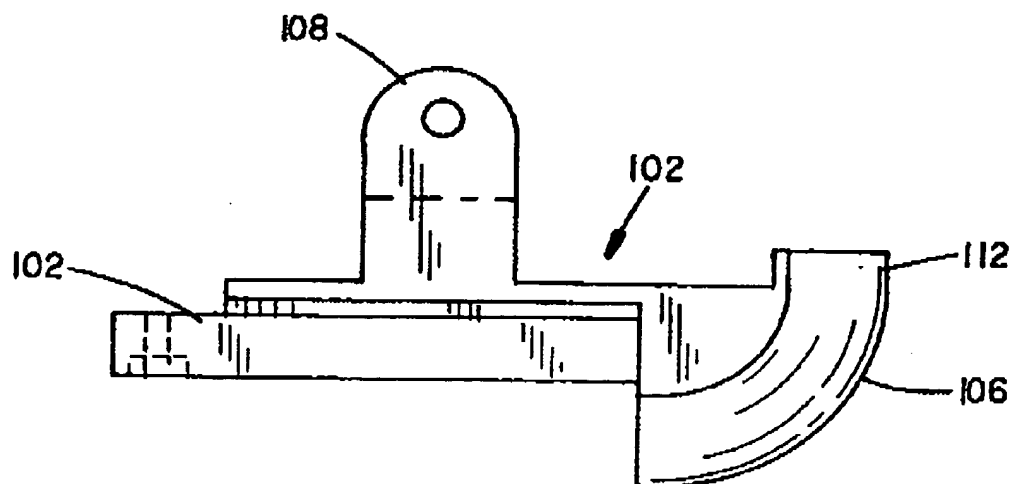


FIG. 10

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SYSTEM FOR COVERING THE BED AND BOX OF A PICK-UP TRUCK, WAGON OR TRAILER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a system for covering an opening in a detachable manner. More specifically, the present invention relates to a system for detachably covering the bed and box of a pick-up truck or trailer.

2. Description of the Prior Art

Since before the advent of the motorized truck, people have understood the need to cover items as the items are transported to protect them from the elements. Generally, when such items are being transported on the bed of a wagon, trailer or truck, this has been accomplished using a tarp. To provide adequate protection, the tarp should be fixed in place along the entire perimeter of the box. The tarp should also be taut and remain so to prevent it from sagging and collecting water or debris. Thus, some reliable means of holding the tarp in place is required to provide effective protection. In the days of the pioneers who explored this continent, ropes were used to hold tarps in place. A variety of fasteners for holding tarps in place have been developed since that time. Fasteners in common use today include bungee cords, hook-and-loop type fasteners, grommets and rope arrangements, various types of snaps, and various types of clips.

One cover arrangement which incorporates a number of different fasteners for securing a tarp in place is disclosed in U.S. Pat. No. 5,174,353 dated Dec. 29, 1992 to Schmeichel et al. The cover arrangement disclosed in this patent, for example, includes a tarp and hook-and-loop type fasteners to attach to the sides of the tarp and the sides of a truck box. This patent also discloses an L-shaped plate which cooperates with various cord members, stops, lips and locks to secure the back end of the tarp in place. This patent also recognizes the difficulty associated with using hook-and-loop type fasteners. Rather than using a different type of fastener, the patent suggests the use of plastic members attached to the tarp to prevent the two elements of the hook-and-loop type fastener from engaging each other as the tarp is rolled and unrolled.

Despite the many attempts made in the prior art to provide a simple, inexpensive and durable cover that can be easily and quickly opened and closed, the need for such a cover continues to exist. The present invention fills this need and solves the problems associated with prior art covers outlined above.

SUMMARY OF THE INVENTION

The present invention relates to a system for covering the box and bed of a truck, wagon or trailer. The system includes a frame. The frame includes a pair of side rails. Each side rail is fixed to the top edge of one of the sides of the box. The side rails have a front end, a rear end, and an outer channel that runs the length of the rail. Fixed to the rear end of each rail is a cam latch. The frame also includes a front rail and a back rail. The front rail is attached to the top edge of the front of the box.

The system also includes a tarp. The tarp has a front edge, a back edge, and a pair of side edges. A bead projects downwardly along the length of each side edge of the tarp. The front edge of the tarp is attached to the front rail of the frame. The back edge of the tarp is attached to the back rail

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of the frame. This arrangement fixes the front of the tarp to the front of the box. It also allows the back rail to be used as a spindle about which the remainder of the tarp can be rolled and unrolled.

The tarp is easily secured in the covered position. The tarp is unrolled. The ends of the back rail are then placed in contact with the two cam latches. The levers of the cam latches are rotated to engage the ends of the back rail to tighten the tarp and lock it in place. To create a water-tight seal along the edges, the beads on the tarp are pushed into the outer channels of the side rails.

The principle object of the present invention is to provide a truck bed and box cover which is easily opened and closed.

Another object of the present invention is to provide such a cover that can be secured in place and left partially open or partially opened to gain access to the interior of the box.

Another object of the invention is to provide such a cover which is durable and stretched tight when closed.

Still another object of the invention is to provide a cam lock that serves to stretch the cover tight.

A further object of the invention is to provide a quick means for securing the sides of the cover to the rails to create a seal along the sides of the cover.

These and other advantages of the present invention will become more clear from a reading of the detailed description of the invention in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a truck box with the cover of the present invention in place.

FIG. 2 is a perspective view of a truck box with the cover of the present invention in place with a corner of the tarp pulled back to expose one of the latches used to secure the tarp.

FIG. 3 is a cross-sectional view of one of the side rails of the frame.

FIG. 4 is a cross-sectional view of one of the side rails showing one way in which the tarp can be releasably secured to the side rail.

FIG. 5 is a cross-sectional view showing one embodiment for securing the tarp to either the front or back rail of the frame.

FIG. 6 is a cross-sectional view showing an alternative embodiment for securing the tarp to either the front or back rail of the frame.

FIG. 7 is a perspective view showing the various components of the latch and how it cooperates with one of the side rails and the back rail.

FIG. 8 is a perspective view with a portion of the tarp cut away to show how the latch cooperates with the back rail and a side rail to secure the tarp in place.

FIG. 9 is a top plan view of the lever of a latch.

FIG. 10 is a top plan view of the mounting member of a latch.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1 and 2 show a cover 10 consisting of a flexible, durable, stretchable tarp 12 and a frame 40. The tarp 12 is preferably made of a water-resistant material or treated to make it water resistant. The tarp 12 has a front edge 14, a pair of side edges 16 and 18, and a back edge 20. Running along and adjacent to each of the side edges 16 and 18 are

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flexible, compressible beads 24. The flexible beads 24 are preferably tapered and about 1/4 of an inch wide at their widest point. The beads 24 are preferably made of an extruded plastic material created from polyvinyl chloride and a tri(2-ethylhexyl) trimellitate plasticizer. As shown in FIG. 4, a cross section of each bead 24 has an arrow-shape defined by a head 80 having a base 82 coupled to a shaft 84. The beads also preferably have a hollow core 86.

The frame 40 includes a front rail 42, a pair of side rails 46, and a back rail 48. The front rail 42 is fixed to the top of the front wall of a vehicle box. The side rails 46 are fixed to the top of the opposing side walls of the vehicle box. As shown in FIG. 3, the rails 46 each include a bottom member 50, an upright center member 52 projecting upwardly and perpendicularly from the center of the bottom member 50, and a pair of channels 54 and 56 located above the bottom member 50 on opposite sides of the upright center member 52. Channel 54 has a generally C-shape and has an opening 58 facing toward the interior of the vehicle box. The opening 58 of channel 54 is defined by a pair of lips 60 and 62. Channel 56 has an opening 64. Opening 64 is defined by a pair of lips 66 and 68. Lip 66 projects downwardly from the top of the upright center member 52 at approximately a 45° angle. Lip 68 has a first leg 70 that projects upwardly from the outside edge of bottom member and a second leg 72 that projects upwardly and inwardly at approximately a 45° angle from the top of the first leg 70. The opening 64 is approximately 0.025 inches wide and runs the entire length of the rail.

For the apparatus to work properly, the front rail 42 should be firmly fixed to the top of the front wall of the vehicle box and to the front edge 14 of the tarp 12. Joining the tarp 12 and front rail 42 can be accomplished in any number of ways. For example, the front rail 42 can have the same general shape as the two side rails 46. As such, the front rail will also have a pair of channels 54 and 56. Ahead, like bead 24, can be provided along the front edge 14 of the tarp 12. This bead can be inserted into channel 56 to fix the front edge 14 to the front rail 42 (see FIG. 4). Alternatively, and as shown in FIG. 5, a loop 28 can be provided along the front edge 14 of the tarp 12. The loop 28 can be inserted into the channel 56. A flexible rod or cord 30 having a diameter larger than the opening 64 can be inserted into the loop 28 through the open end of the front rail 42 to further secure the front edge 14 of tarp 12 and the front rail 42 together. The front edge 14 of the tarp 12 and the front rail 42 can also be joined together using a row of spaced snap closures. See FIG. 6. The snap closures can be spaced six inches apart, for example. Each snap closure includes a female snap member 32 fixed along the front edge 14 of the tarp 12 and a male snap member 34 fixed to the front rail 42 of the frame 40. The female snap members 32 and male snap members 34 are positioned and shaped to interlock to join the front rail 42 to the front edge 14 of the tarp 12. Each of these and other arrangements can be used to fix the front edge 14 of the tarp 12 to the front rail 42 which, as indicated above, is fixed to the top of the front of the truck box.

The back rail 48 of the frame 40 has two primary functions. The first is to serve as a spindle about which the tarp 12 can be rolled or unrolled. The second is to assist in stretching the tarp 12 and holding it over the truck box in a covered position. To perform these functions effectively, the back rail 48 should not be permanently fixed to the box of the truck. The back rail 48, however, should be fixed to the back edge 20 of the tarp 12. Any of the techniques described for joining the front edge 14 to the front rail 42 are suitable for joining the back edge 20 to the back rail 48. To reduce

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production costs, the back rail 48 will preferably have the same elements as the two side rails 44 and 46. As such, the back rail 48 will have a bottom member 50, and upright center wall member 52, and a pair of channels 54 and 56 located above the bottom member 50 and on opposite sides of the upright center member 52. Channel 54 will have an opening 58 defined by a pair of lips 60 and 62 and channel 56 will have an opening 64 defined by a pair of lips 66 and 68.

An important feature of the present invention are the two cam latches generally designated 100 which are located at the back end of each side rail 46. Each cam latch has a mounting member 102. The mounting member 102 is sized so that it can be slid into the C-shaped channel 54 through the back open end of the side rail. The width of the mounting member is such that it cannot pass through the opening 58 of the C-shaped channel 54. The mounting member can be fixed in place in the channel using a set screw 104.

Integrally molded with the mounting member 102 are a stop member 106 and a pair of hinge elements 108 and 110. The stop member 106 covers the back end of both channels 54 and 56 of the rail. The stop member 106 also includes a ledge 112 that projects inwardly from the side rail toward the other side rail.

Each cam latch also includes a lever 114. The lever 114 is attached to the hinge elements 108 and 110 by a pin 116 so that the lever can rotate about the pin 116. The lever 114 includes a handle 118 and an engagement member 120 at the end of the handle 118 nearest the hinge elements 108 and 110. The width of the engagement member is less than the width of the opening 58 to the C-shaped channel 54 of the back rail 48.

Now that the various components that make up the cover 10 have been described, its installation and operation will be explained.

The front rail 42 and the side rails 46 are fixed to the respective tops of the front and side edges of the box. An attachment is made between the front edge 14 of the tarp 12 and the front rail 42 using any of a variety of techniques such as those discussed above. An attachment is also made between the back rail 48 and the back edge 20 of the tarp 12. The mounting member 102 of the two cam latches 100 are each inserted through the open back end of the opposing side rails 46 and secured in place using a set screw 104. This installation is very simple. Once complete, it allows one to roll the tarp 12 up around the back rail 48 toward the front rail 42 and the front of the box or roll it out toward the back of the box.

When one desires to cover the box, the tarp 12 is rolled out. The back rail 48 and the tarp 12 are long enough so that the ends of the back rail 48 can be placed between the ledge 112 and the engagement member 120 of each cam latch 100 with the opening 58 of the channel 54 of the back rail 48 facing the engagement members 120. The handles 118 of the two cam latches 100 are then rotated so that the engagement members 120 pivot toward the back rail 48, pass through the opening 58 into the channel 54 of the back rail 48 and engage the upright center member 52 of the back rail 48. Continued rotation of the handles force the back rail 48 back so as to tighten the cover and bring the back rail 48 into engagement with the ledges 112 of the stop members 106. Upon full rotation of the two cam latches 100 into the locked position (shown in FIG. 8), the ledges 112 and engagement members 120 cooperate to hold the tarp 12 in place. The sides of the tarp 12 are then fully secured in place by inserting the beads 24 along the side edges 16 and 18 of the

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tarp 12 through the openings 64 of the channels 56 of the side rails 46 to create a sufficiently tight seal along each side of the tarp 12. This tight seal is created by pushing the head 80 of each bead all the way through the opening 64 so that base 82 of the head 80 of beads 22 or 24 are captured by the lips 66 and 68 of the opening 64 in the side rails. See FIG. 4

Opening the cover is also very straightforward. All one needs to do is rotate the handles 118 of the cam latches 100 in the opposite direction until the engagement members 120 are no longer positioned in the channel 54. This serves to relieve the tension on the cover permitting the back rail 48 to be pushed forward past the ledge 112 and then lifted up. One can then roll the cover up using the back rail 48 as a spindle. The forces applied when rolling are generally sufficient to pull the beads 22 and 24 from the channels 56 of the side rails 44 and 46.

What is claimed is:

1. An apparatus for covering the open top of a vehicle box of the type defined by a head, an upright front wall, a pair of opposing upright side walls, and an open top, said apparatus having a first state in which the open top is at least partially covered and a second state in which the open top is uncovered, said apparatus comprising:

(a) a frame including a front rail secured in position at the front of said box, first and second side rails each secured to one of said pair of opposing upright side walls of the box and each having a front end and a back end, and a back rail having a first end and a second end;

(b) a stretchable tarp having a front edge, a back edge, a first side edge and a second side edge;

(c) means for securing the front edge of said tarp to said front rail;

(d) means for securing the back edge of said tarp to said back rail;

(e) means for releasably securing said first side edge of said tarp to said first side rail;

(f) means for releasably securing said second side edge of said tarp to said second side rail;

(g) a first cam latch for releasably securing the first end of said back rail to the back end of said first side rail, and a second cam latch for releasably securing the second end of said back rail to the back end of said second side rail, each of said cam latches being secured to a side rail and having a stop member, each of said cam latches also having a lever rotatable in a first direction and in a second direction opposite the first direction, said lever including a handle and an engagement member which engages the back rail and, upon rotation of the lever in the said first direction, causes the tarp to stretch and the end of the back rail to engage said stop member and, upon rotation in the second direction, allows the tarp to be released from said stop member.

2. The apparatus of claim 1 wherein said means for releasably securing said first side edge of said tarp to said first side rail comprises a channel having an opening running from the front end to the back end of said first side rail and a flexible, compressible bead running along the first side edge of said tarp, said bead being sized to be insertable through the opening of said channel and cooperative therewith to releasably secure the first side edge to the first side rail; and wherein said means for securing said second side edge of said tarp to said second side rail comprises a channel having an opening running from the front end to the back end of said second side rail and a flexible, compressible bead running along the second side edge of said tarp, said bead

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being sized to be insertable through the opening of said channel and cooperative therewith to releasably secure the second side edge to the second side rail.

3. An apparatus for covering the open top of a vehicle box of the type defined by a front, a back, a first side wall, a second side wall and an open top, said apparatus having a first state in which the open top is covered and a second state in which the open top is uncovered, said apparatus comprising a tarp having (a) a front edge secured to a front rail, said front rail secured in position at the front of the box; (b) a back edge secured to a back rail, said back rail releasably securable at the back of the box by a pair of cam latches, each of said cam latches being secured to a side rail and having a stop member, each of said cam latches also having a lever rotatable in a first direction and in a second direction opposite the first direction, said lever including a handle and an engagement member which engages the back rail and, upon rotation of the lever in said first direction, causes the tarp to stretch and the end of the back rail to engage said stop member and, upon rotation in the second direction, allows the tarp to be released from said stop member; (c) a first side edge having a first flexible compressible bead along its length and extending therefrom, said bead being sized and shaped to be insertable into and cooperate with an opening of a channel in a first side rail, said first side rail fixed to said first side of said box; and (d) a second side edge having a second flexible, compressible bead along its length and extending therefrom, said bead being sized and shaped to be insertable into and cooperate with an opening of a channel in a second side rail, said second side rail fixed to said second side of said box.

4. The apparatus of claim 3 wherein said openings of said channels in said first and second rails are each defined by a first lip and a second lip.

5. The apparatus of claim 3 wherein said first and second flexible, compressible beads have a head and a shaft.

6. The apparatus of claim 3 wherein said first and second beads have a shaft and a head with a base and the openings of channels of said first and second side rails are each defined by a first lip and a second lip such that the head of the bead can be inserted past the first and second lips which cooperate with the base of the head to releasably secure the head of the bead within the channel.

7. The apparatus of claim 3 wherein said first and second beads have a hollow core.

8. The apparatus of claim 3 wherein said first and second beads are made of an extruded material.

9. The apparatus of claim 8 wherein said material is a plastic created from a polyvinyl chloride and a tri (2-ethylhexyl) isocellulose plasticizer.

10. An apparatus for selectively covering said open top of a vehicle box of the type defined by a front, a back, a first side wall and a second side wall, and an open top, said apparatus including:

(a) a first side rail fixed to the first side wall of the box, said first side rail having a front end and a back end;

(b) a second side rail fixed to the second side wall of the box, said second side rail having a front end and a back end;

(c) a front rail fixed in place at the front of the box;

(d) a back rail having a first end and a second end;

(e) a first cam latch fixed to the back end of the first side rail for engaging and releasably securing the first end of the back rail;

(f) a second cam latch fixed to the back end of the second side rail for engaging and releasably securing the second end of the back rail, and

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(g) a tarp having a front edge, a back edge, a first side edge and a second side edge, said front rail being securable to said tarp along its front edge, said back rail being securable to said tarp along its back edge, said first side rail being securable to the tarp along its first side edge, and said second side rail being securable to said tarp along its second side edge

11. The apparatus of claim 10 wherein said first side rail is securable to said tarp along its first side edge through cooperation between a channel in the first side rail and a first bead on the tarp.

12. The apparatus of claim 11 wherein said second side rail is securable to said tarp along its second side edge through cooperation between a channel in the second side rail and a second bead on the tarp.

13. The apparatus of claim 12 wherein said first and second beads are comprised of an extruded material which is flexible and compressible

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14. The apparatus of claim 13 wherein said beads, in cross-section, have an arrow-shape defined by a head joined to a shaft

15. The apparatus of claim 10 wherein first and second cam latches each include a mounting member, a stop member, and a lever pivotally mounted to the mounting member, said lever including a handle and an engagement member for engaging an end of the back rail and forcing said end of the back rail into contact with the stop member to selectively secure the back rail and tarp so that the open top of the box is covered.

16. The apparatus of claim 15 wherein said back rail includes a channel having at least one wall member and an opening through which the engagement member passes before engaging said wall member of the back rail to force said back rail into contact with said stop member

* * * * *

A. Concave or
biconcave lens.
B. Convex-concave
lens. C. Convex-
convex lens

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